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Petrological Study Of Kalrayan Hill, Villupuram District Of Tamil Nadu

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Abstract

The present research is based on the study of Lithology in the Kalrayan hills. Detailed petrographic study of collected sampled rocks monitored in this study. The rock samples are collected from 16 locations of the study area. Thin section for all rocks is prepared in laboratory for the megascopic observation. Different types of methods used in this research which are literature survey, field study, laboratory study and petrographic study. From the megascopic observation it's found that different types of rocks present in this study area. Dolerite, Dolerite with coarse grain, Hornblende gneiss and Charnokite rocks present in the study area. Dolerite composed of quartz, labradorite, augite, and hornblende while Dolerite with coarse grain composed of quartz, orthoclase, labradorite, biotite, hornblende, and microcline. Hornblendegneiss composed of hornblende and feldspar and Charnokite composed of quartz, orthoclase, labradorite, microcline, hornblende, diopside. Both Dolerite and Dolerite with coarse grain found as intrusive and the batholiths in magma, seen in major parts of peninsular India while Charnockite rocks are situating bellow laterite.

Keywords: Dolerite, Charnokite, Hornblende gneiss, petrographic study, thin section.

Introduction

Petrological study is defined as the study of different types of rocks which are present in the Earth. Different rock type such as Charnockite, layered mafic complexes, Quartzofeldspthic Migmatitic Gneisses, Granites and abundant conformable metasedimentary rocks including Quartzites, Marbles, Granet-Sillimanite Gneisses etc. are characterized Granulite mobile belts. Central Indian tectonic zone divides the northern and southern shields. Aravalli craton and Bundelkhand complex dominate the northern shield. According to the research done by

Mahabaleswar et al. (1995); Radhakrishna et al. (1986) and Yoshida et al. (1996) The southern coverincludes of theSinghbhum,Dharwar and Baster cratons which are restricted by Granulite belts of Archaean and Proterozoic ages.

From the study done by Mahadevan, (1994) defined that two stage course of cratonization are experienced from the Indian shield.The cratonization of the Archean Greenstone-Granite domain found in early period of 2500 Ma and the progressive cratonization of the high-grade Granulite domain found in between 2500-1600 Ma. According to the research of Pascoe (1950) the boundary between the two domains is drawn in the south and east by the Former line, which is traced from the Orissa cost (North of Cuttack) through the Talcher coal field the Nellore Madras cost and then across the shield to the west coast North of Mangalore (Pascoe,1950).

Mahadevan (1994) derived that the eastern limits of the Mesozoic rift that ushered in the Deccan volcanism, determined the western boundary of the greenstone-granite domain. According to another research done by Mahadevan (1992) it states that on the North, the boundary of the Greenstone-Granite domain is rather spread. Mojunder (1998) studied that the high-grade Granulite domain covers major part of the Chhotanagpur Gneissic plateau and the western part of the Shillong plateau. Rajarao et al. (1971) and Desai et al. (1978) found that the outcrops of high-grade granulites occur on the eastern and western side of the Delhi super-group belt of the Aravalli range and to its south. Pascoe (1950) and Yedekar et al. (1990) given a result that Charnockite rocks occur over a 100 KMs long belt between the Sausars and Sakolis in Central india.

Materials and methods

Study area

Kalrayan hill is the nearest to the city Kallakurichi about 56Kms, and it lies on the western part of Kallakurichitaluk, Villupuram district. Villupuram District lies between 12˚ 20 44' S and 79˚ 42 55' E. Villupuram District consist of 1490 Revenue villages, 4 Revenue Divisions, 8 Administrative Taluks, 22 Blocks, 16 Town Panchayats and 2 Municipalities. Fig.1 describes the map of study area.

The climate is generally cooler than the plains. Temperature of the area ranging from 15° to 30° C which is comes under tropical climate. InKalrayan Hills dry season found in January to March, hot season in April and May, monsoons season in June to September and the North East monsoons from October to December. Most of the rainfall form by NE monsoons and to some extent the SW monsoons. The total annual rainfall of the area ranges from 760 to 1200 mm.

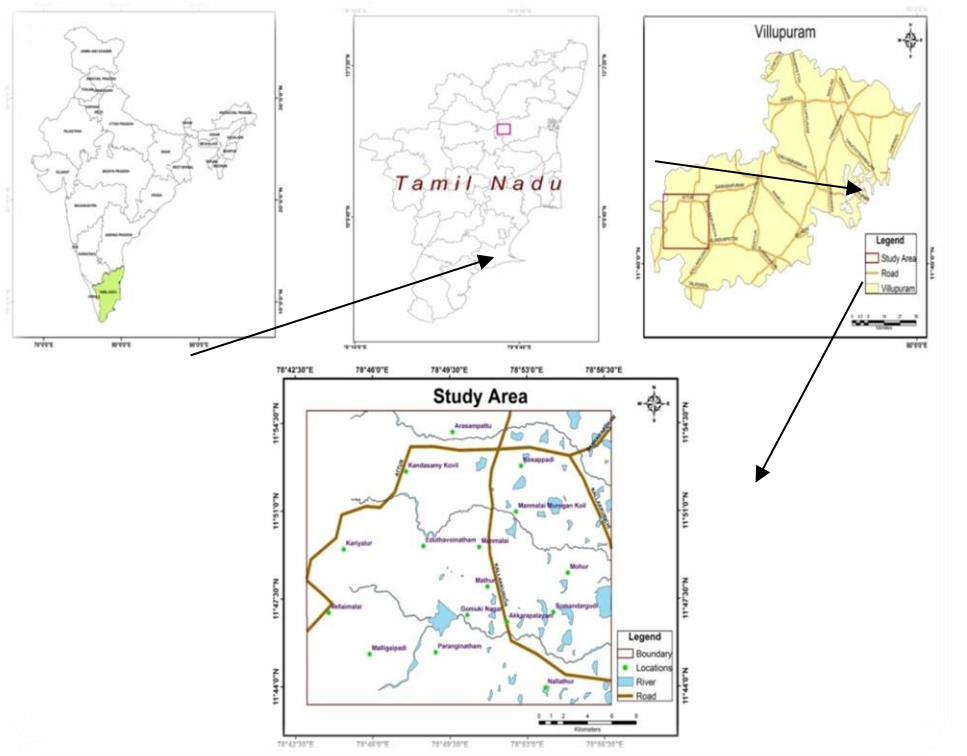

Fig.1 Study area

Data collection

Total of 30 fresh samples are collected from 16 location of the study area (Table 1). Numbering of the samples is done systematically according to locality and types of the rock. Megascopic behaviour of the collected samples was carefully recorded.

Table 1. Location of samples

Sl No.	Name of the location	Lattitude	Longitude
1	Nallathur	N 11̊ 44’27”	E78 ° 54’ 51”
2	Akkarapalayam	N 11°45’53”	E78 °52’1”
3	Gomukhi Dam	N11°47’12”	E78°48’43”
4	Paranginatham	N11°46’37”	E78°47’31”
5	Malligaipadi	N11°46’7”	E78°46’16”
6	Vellaimalai	N11°47’34”	E78°48’51”

7	Kariyalur-P	N11˚48’48”	E78˚42’37”
8	Mathur	N11˚48’8”	E78˚51’29”
9	Manmalai	N11˚49’39”	E78˚50’47”
10	ManmalaiMurugankoil	N11˚50’10”	E78˚50’4”
11	KandasamiKovil	N11˚50’58”	E78˚49’52”
12	Eduthabainatham	N11˚51’41”	E78˚50’19”
13	Koshappadi	N11˚52’42”	E78˚51’1”
14	Arasampattu	N11˚53’38”	E78˚50’51”
15	Somandarguid	N11˚45’48”	E78˚56’15”
16	Mohur	N11˚45’38”	E78˚56’21”

Methodology

In this present study following methods are adopted:

i) Field studies

A Field study includes identification, collection of rock samples, plotting the sampled points in topographical maps followed by the recording of the field and megascopic character. Details of the collected sample location are recorded. Various geomorphic features, trends and structures of the exposed rocks bodies and its relation with the country rocks were recorded in detailed in the field diary.

ii) Laboratory study

Petrographic study, mineral studies are carried out in laboratories.

iii) Peterographic study

Peterographic studies were carried out for 15 sections. After short listing for about 10 thin sections are studied in detail. From the detail studies we monitor the textural relationship, mineral composition, relative distribution of different minerals and there alteration ad cooling history.

Results and discussion

In fig.2, Fig.4 and Fig.5 it found that the rock is chiefly composed of quartz, orthoclase, labradorite, biotite, hornblende, and microcline. It exhibiting ophitic texture, it consists of laths of plagioclase and engulfment of clinopyroxene. The rock can be named as Dolerite with coarse grain. Usually these rocks are found as intrusive and the batholiths in magma, seen in major parts of peninsular India.

Most of the minerals are crystallized simultaneously with gronoblastic texture exhibiting gnessosity of alternating bands of hornblende and feldspar. Hence the rock can be called Hornblende Gneiss (Fig.2, Fig.6). As they are of regional metamorphism they are found in larger area in the peninsular India.

In Fig.7 and Fig.10 rock is chiefly composed of quartz, orthoclase, labradorite, microcline, hornblende,diopside. It exhibitshypidiomorphic texture. The rock can be named as Charnockite. Usually charnokite rocks are large batholiths and the laterite is the residual sedimentary rock derived from the parent rock of charnockite which is situating bellow laterite.

In Fig.8, Fig.9 and Fig.11 rock is chiefly composed of quartz, labradorite, augite, and hornblende. Its origin is hypabyssal and it consists of euhedral crystals are partially or completely surrounded by anhedralaugite crystals.The rock can be named as Dolerite. Usually these rocks are found as intrusive and the batholiths in magma, seen in major parts of peninsular India**.**

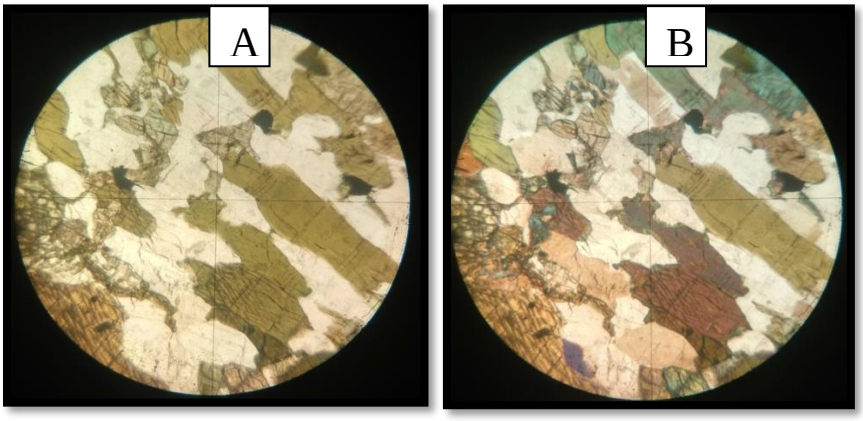

Fig. 2 Photomicroscope of Dolerite from Nalathur(A), exhibiting sub-ophitic texture(B)

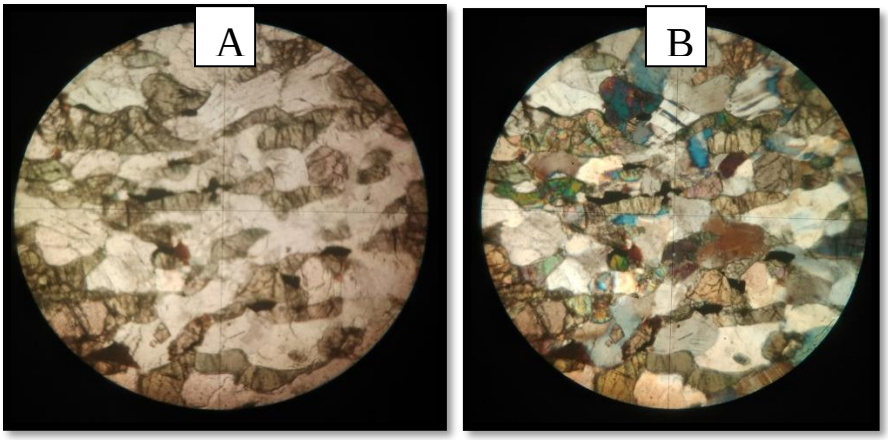

Fig. 3 Photomicroscope of Hornblende gneiss from GomukhiDam (A), exhibiting Gneissosity(B)

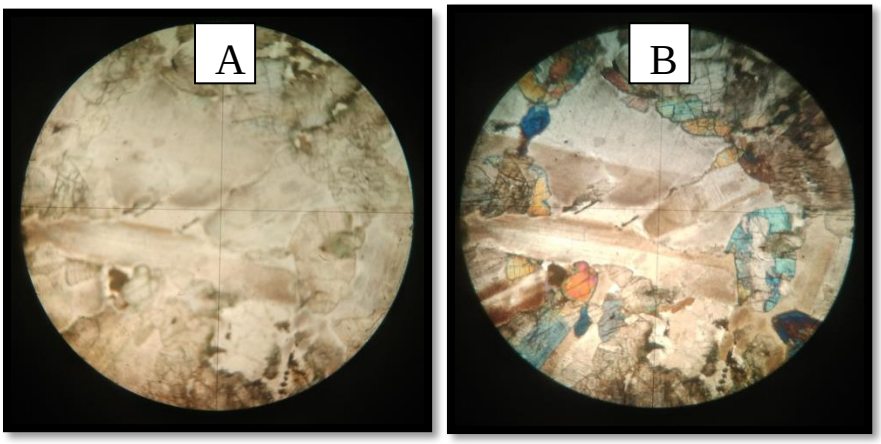

Fig. 4 Photomicroscope of Dolerite from Paranginatham (A), exhibiting Ophitic texture (B)

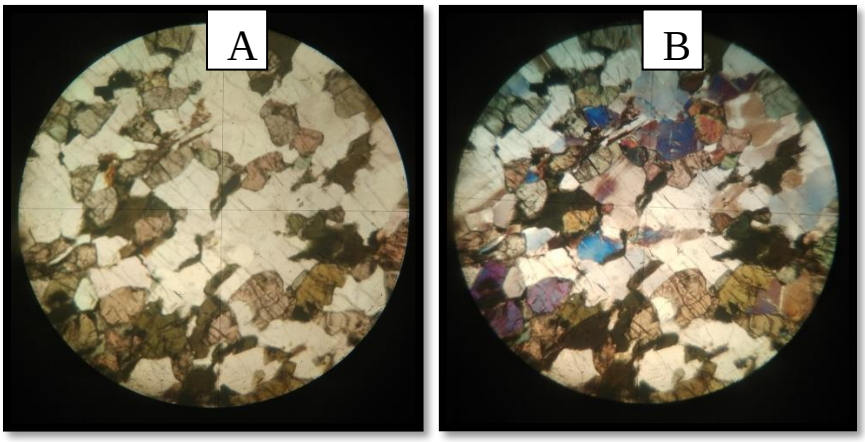

Fig. 5 Photomicroscope of Dolerite from Mallaigaipadi (A), exhibiting sub-ophitic texture (B)

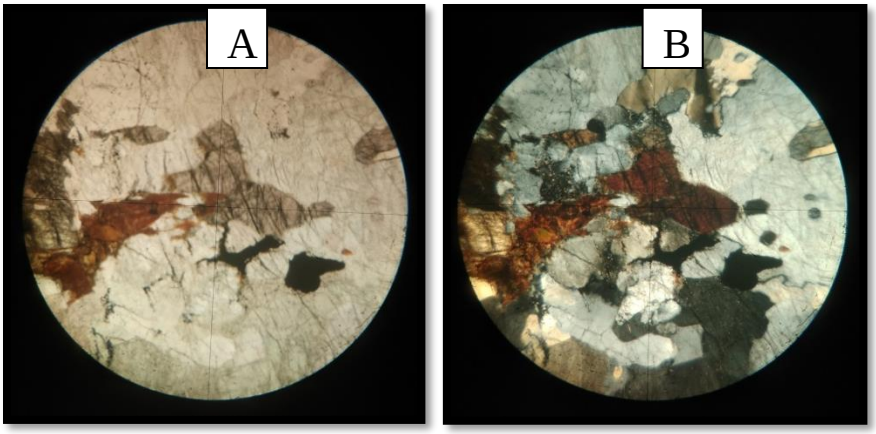

Fig. 6 Photomicroscope of Hornblende gneiss from Vellaimalai (A), exhibiting Gneissosity (B)

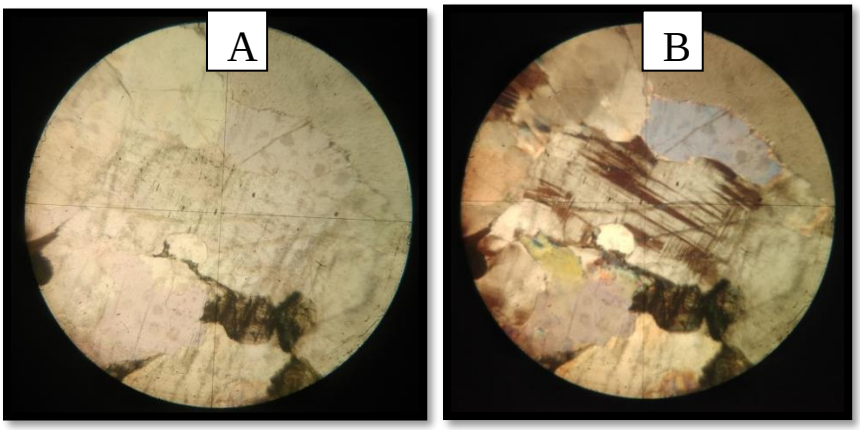

Fig. 7 Photomicroscope of Charnockite from Vellaimalai (A), exhibiting Hypidiomorphic texture (B)

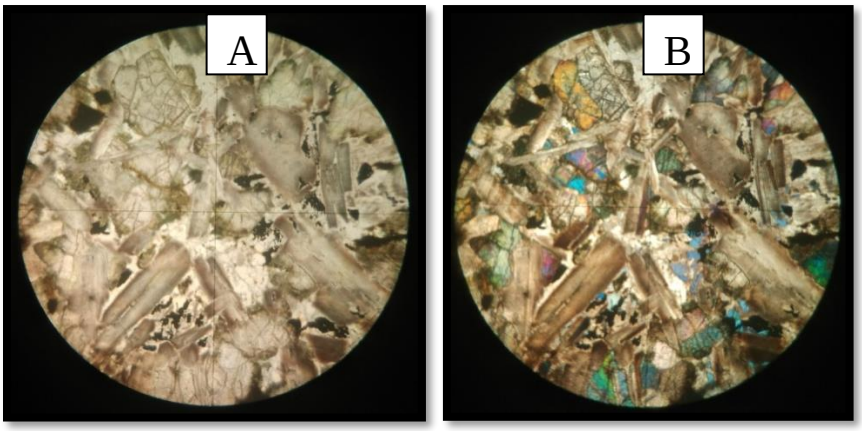

Fig. 8 Photomicroscope of Dolerite from Mathur (A), exhibiting Ophitic texture (B)

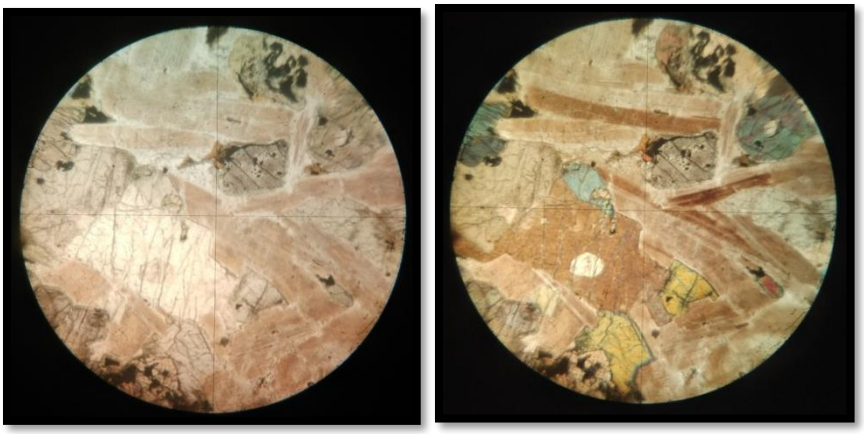

Fig. 9 Photomicroscope of Dolerite from Manmalai (A), exhibiting Sub-Ophitic texture (B)

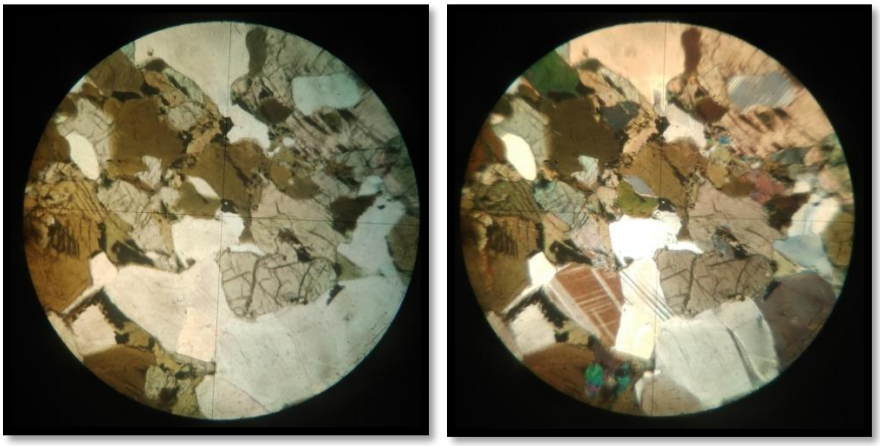

Fig. 10 Photomicroscope of Charnockite from Koshappadi (A), exhibiting Hypidiomorphic texture (B)

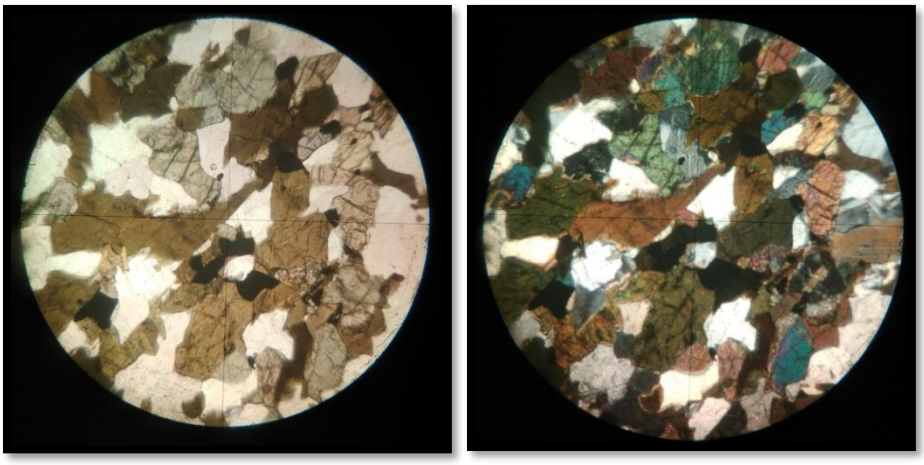

Fig. 11 Photomicroscope of Dolerite from Arasampattu (A), exhibiting sub-ophitic texture (B)

Conclusion

This is a preliminary pilot study of the district with the texturestudies of dolerite. The Villupuram district is fairly rich in minerals, the most important of which are copper, lead and zinc, clay iron ore, dolerite, lime shells, reh salts/soil, silica sand. Major parts of the district is having the rocks belonging to Archaean age i.e. Charnockite group, the Migmatite, complex, Sathiamangalam group and the Bhavani group and Alkai complex of proteozoic age. The district is also is noted for multicoloured granite occurrence which is present in Gingee Area. The geological setting of the dolerite clearly indicates that they are the youngest sequence in the area. A petrographic study of the dolerite reveals equilibrium conditions of crystallization. Ophitic and sub-ophitic textures are found to occur. Dolerites are categorized as a major exportable commodity among the dimension stones in India. India posses 11,114 thousand cubic meters of proved recoverable reserves of black granites.

The hills contain basic crystalline metamorphic rocks of Archaean age i.e., composite gneiss, charnockites, ultramafic rocks, magnetite and granite. The depth of weathering is limited to the order of 1 to 5 m in the hill.

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